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Project Summary

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Ambient Monitoring for PCB After Remedial Cleanup of Two Landfills in the Bloomington, Indiana Area

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A monitoring program was conducted to determine PCB levels in ambient air on and in the vicinity of two landfills at which interim remedial cleanup measures have been performed. The landfill sites are in the Bloomington, Indiana area. The sampling locations and methods used were the same as those used in a June and July, 1983 pre-cleanup monitoring program.

Monitoring data obtained at former hot spots on the sites (where exposed capacitors were visible) were much lower than the pre-cleanup monitoring levels. However, PCB concentrations measured at downwind locations at the site boundaries during the pre- and post-cleanup monitoring were about the same.

Collocated monitoring conducted during the study showed that both the low- and high-volume sampling methods yielded reliable, reproducible measurements of airborne PCB levels.

This Project Summary was developed by EPA's Environmental Monitoring Systems Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

Three landfill sites in the Bloomington, Indiana, area were used to dispose of capacitors containing polychlorinated biphenyls (PCBs). The sites were Neal's Landfill, Neal's Dump and Lemon Lane Landfill. Visual surveys of these sites show several areas where capacitors are visible at or above ground level. In most of the areas, leakage of the capacitors is suspected because of wet soil and damage to the surrounding vegetation. Consequently, PCBs may be emitted, thus creating an air pollution problem.

During June and July 1983, a field program was conducted to monitor PCB levels in the ambient air at selected locations on and surrounding the three landfill areas. Airborne PCB measurements on the sites were performed at localized areas (hot spots) where leaking capacitors were evident. Measurements were made at locations in the vicinity of the sites to determine upwind background levels and downwind emission levels.

During the spring of 1984, interim remedial cleanup measures were conducted at Neal's Landfill and Neal's Dump to reduce PCB emissions. Following the cleanup operations, monitoring was performed to determine the reduction of airborne PCB levels on and in the vicinity of the two landfill sites. Monitoring locations and procedures employed were the same as those used in the previous study. Battery-operated, personal-type pump systems were used to sample during 8-hour daytime periods at a fixed height above hot spots.

High-volume systems were employed to sample for 24-hour periods at hot spots, upwind background locations and downwind site perimeter locations. Vertical concentration profiles at hot spot areas during 8-hour daytime periods were determined with an array of five battery-operated sampling systems positioned at different elevations above ground level. Polyure-

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thane foam (PUF) cartridges were used in all the sampling systems to collect PCBs from the ambient air. The quantity of PCBs collected in the PUF cartridges during sampling was determined by extracting and analyzing the extract by electron-capture gas chromatography using EPA Method 608. Meteorological conditions (wind speed and direction, temperature and relative humidity) were monitored, during sampling at the sites, to assist in interpreting PCB measurements.

This study was conducted to provide EPA Region V with data on airborne PCB levels following interim remedial cleanup of the two landfill sites.

Experimental Procedures

PCB Monitoring Procedures

As in the previous study, three different sampling procedures were used to measure ambient air PCB concentrations and emission patterns on and in the vicinity of the landfill sites. The procedures used were low-volume, vertical profile, and high-volume.

Dupont P-4000A battery-operated, low-volume samplers (flow rate ~3.8 L/min) were used to sample the ambient air at hot spots on the landfill sites and at upwind locations. The samplers were positioned with inlets of the PUF cartridges at 1.8 m above ground level. Sampling at hot spots was performed immediately downwind of the hot spot area over 8-hour daytime periods from about 0900 to 1700 hrs CDT.

Measurements of the vertical PCB concentration profiles were performed with a vertical array of five DuPont low-volume samplers. The array was positioned directly over a hot spot area with inlets of the PUF cartridges at 2, 30, 60, 120, and 180 cm above ground level. Sampling was performed for 8-hr periods, starting at ~0900 and terminating at ~1700 hrs CDT.

EPA high-volume systems (flow rate ~8 cfm) were used to collect approximately 24-hr samples upwind of the sites, at hot spots on the sites, and along the downwind perimeter of the sites. The EPA samplers were situated with the inlets about 1.2 m above ground level and were located, to the extent possible, in areas where air flow was unrestricted in the windward direction.

The types and locations of samples collected at each site are summarized in Table 1.

Table 1. Sampling Program Summary

Site/Sampling Dates (1984)	Sampling Location[a]	Type of Sampling Performed[b]
Neal's Landfill	HS-A	8hrLV, 8hrVP
July 24, 25, 27, and 28	-C	8hrLV, 24hrHV, 8hrVP
	-E	8hrLV
	DW-2	24hrHV
	-3	24hrHV
	-4	24hrHV
	UW	24hrHV
Neal's Dump	HS-A	8hrLV, 24hrHV
July 25 and 27	DW	24hrHV
	UW	24hrHV

[a] HS - hot spot, DW - downwind, and UW - upwind.
[b] LV - DuPont low volume sampler, HV - EPA high volume sampler, and VP - in-line vertical array of five DuPont low volume samplers.

Table 2. Comparison of Pre- and Post Cleanup Monitoring Data

Sampling Location	Sample Type	Range of PCB Concentrations (µg/SCM) Found	
		Pre-Cleanup	Post-Cleanup
Neal's Landfill			
HS-A	8hr LV	5.1-11	0.4-1.4
	VP-2cm	552-1053	2.3-3.2
	VP-30cm	56-120	1.1-1.8
	VP-60cm	30-49	0.9-1.2
	VP-120cm	10-23	0.7-1.4
	VP-180cm	6.4-13	0.4-0.6
HS-C	8hr LV	5.3-12	1.7-2.5
	24hr LV	5.2-14	3.1-4.8
	VP-2cm	941-1108	11.5-21.3
	VP-30cm	111-157	4.1-5.8
	VP-60cm	40-62	1.7-5.1
	VP-120cm	15-21	1.7-3.1
	VP-180cm	8.6-16	1.5-2.5
HS-E	8hr LV	7.3-18	ND(<0.04)
UW	24hr HV	0.08-0.09	0.2-0.3
DW-2	24hr HV	0.8-1.8	1.1-1.4
DW-3	24hr HV	0.8-1.8	0.8-1.2
DW-4	24hr HV	0.3-0.7	0.4-0.6
Neal's Dump			
HS-A	8hr LV	7.9-19	0.8-0.9
	24hr HV	23-61	2.7-3.1
UW	24hr HV	0.1-0.2	0.1-0.2
DW	24hr HV	0.1-0.2	0.1

PCB Analysis Procedure

Analysis for PCBs in the PUF cartridges (and high-volume filters) was performed according to the procedure described in the EPA Manual of Analytical Methods. The steps in the analysis procedure included: a) Soxhlet extraction of the foam plugs (and filters in the case of high-volume samplers) with 5 percent ether in hexane; b) concentration of the extract to 1 mL; and c) determination of PCBs in an aliquot of the extract by electron capture-gas chromatography using EPA Method 608.

Meteorological Measurements

Measurements of wind speed, wind direction, and ambient temperature were performed with Meteorological Research, Inc. (MRI) portable weather stations. One unit was located at Neal's Landfill and a second unit was used to collect meteorological data at Neal's Dump. Strip chart data from the meteorological systems

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were manually reduced to obtain hourly averages. Relative humidity data were obtained from wet/dry bulb temperature measurements made periodically during daytime sampling periods.

Results and Discussion

PCB concentrations in ambient air, measured at locations on Neal's Landfill/Dump and in their vicinity after the interim remedial cleanup, are shown in Table 2. As shown in the table, post-cleanup PCB levels measured at hot spots on the sites are lower than the pre-cleanup levels. However, at HS-A and HS-C on Neil's Landfill and HS-A on Neal's Dump, there appears to be residual contamination which gives rise to airborne PCB concentrations that are slightly above background levels.

In general, there is very little difference in pre- and post-cleanup PCB levels measured at the downwind locations at the two landfills. The pre- and post-cleanup levels measured upwind at Neal's Dump were approximately the same. PCB levels observed upwind of Neal's Landfill during the post-cleanup monitoring program were higher than those measured during the pre-cleanup monitoring.

During the post-cleanup monitoring period, maximum temperatures were in the range of 25 to 28 °C and there was frequent rainfall. In contrast, maximum temperatures during the pre-cleanup monitoring period were frequently in excess of 38 °C and there was an absence of rainfall.

Conclusions

The results of the monitoring program show that the interim remedial cleanup reduced airborne PCB at former hot spots on the landfill. Airborne PCB levels at the downwind site boundaries remain about the same as observed during the pre-cleanup monitoring.

Modifications of the high-volume samplers by replacing the conventional motor with a by-pass type significantly improved the reliability and durability of this unit.

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The complete report, entitled "Ambient Monitoring for PCB After Remedial Cleanup of Two Landfills in the Bloomington, Indiana Area," (Order No. PB 86-177 532/AS; Cost: $11.95, subject to change) will be available only from:

National Technical Information Service
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